

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
15 April 2004 (15.04.2004)

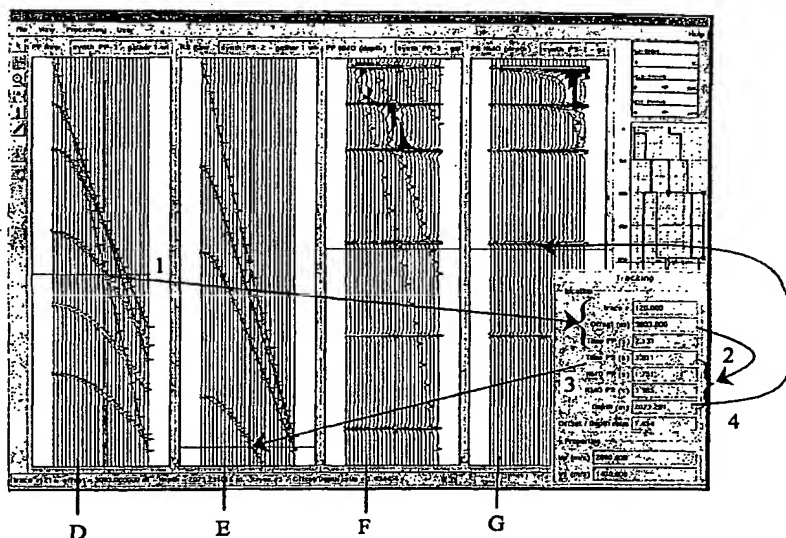
PCT

(10) International Publication Number
WO 2004/031805 A1

- (51) International Patent Classification⁷: **G01V 1/28**
- (21) International Application Number:
PCT/GB2003/004364
- (22) International Filing Date: 7 October 2003 (07.10.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/416,507 7 October 2002 (07.10.2002) US
0308781.4 16 April 2003 (16.04.2003) GB
- (71) Applicant (for all designated States except CA, FR, US):
WESTERNGECO SEISMIC HOLDINGS LIMITED
[—/—]; P.O. Box 71, Craigmuir Chambers, Road Town,
Tortola (VG).
- (71) Applicant (for FR only): **SERVICES PETROLIERS
SCHLUMBERGER** [FR/FR]; 42, rue Saint Dominique,
F-75007 Paris (FR).
- (71) Applicant (for CA only): **WESTERNGECO CANADA
LIMITED** [CA/CA]; 24th Floor, Monenco Place, 801 6th
Avenue SW, Calgary, Alberta TP2 3W2 (CA).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **AARRE, Victor**
[NO/NO]; R. Steens Gate 33, N-4010 Stavanger (NO).
LAURENT, Christophe [FR/GB]; 25 Riverside, Horley,
Surrey RH6 7LN (GB).
- (74) Agents: **MARKS & CLERK** et al.; 4220 Nash Court, Ox-
ford Business Park South, Oxford, Oxfordshire OX4 2RU
(GB).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE,
GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK,
MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT,
RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,

[Continued on next page]

(54) Title: PROCESSING SEISMIC DATA



(57) Abstract: A method of processing seismic data comprises identifying the value of a first parameter associated with an event in a first set of seismic data. The value of a second parameter associated with a corresponding event in a second set of seismic data is then obtained using at least one look-up table. The first parameter may be, for example, PP travel time with the first data set being a raw PP data set, and the second parameter may be, for example, PS travel time with the second data set being a raw PS data set or reflection depth. The invention makes it possible to identify pairs of corresponding PP and PS events in raw data traces. The look-up table(s) are obtained using an assumed model for the velocity of propagation of acoustic energy within the earth. The results of the method may be used in quality control, or may be used to correct the velocity model.

BEST AVAILABLE COPY



SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/GB 03/04364

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01V1/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01V

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02 059647 A (SCHLUMBERGER CA LTD ;SCHLUMBERGER SERVICES PETROL (FR); CURTIS AND) 1 August 2002 (2002-08-01) page 12, line 1-20 page 15, line 16-25 figures 1-14	1,7-12, 18-22
X	WO 02 46792 A (SCHLUMBERGER CA LTD ;MUIJS REMCO (CH); SCHLUMBERGER SERVICES PETRO) 13 June 2002 (2002-06-13) column 4, line 64 -column 5, line 50 column 10, line 36 -column 11, line 7 figures 4,18	1,7-12, 18-22
A	US 5 229 939 A (SCHEIBNER DAVID J ET AL) 20 July 1993 (1993-07-20) column 8, line 19 -column 10, line 18 figures 4,7,9	1-22

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

5 February 2004

Date of mailing of the international search report

12/02/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Modesto, C

INTERNATIONAL SEARCH REPORT

Internat Application No
PCT/GB 03/04364

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 02059647	A	01-08-2002	CA 2435643 A1 01-08-2002 EP 1354221 A1 22-10-2003 WO 02059647 A1 01-08-2002 NO 20033311 A 25-09-2003
WO 0246792	A	13-06-2002	AU 3479402 A 18-06-2002 CA 2431251 A1 13-06-2002 EP 1340101 A2 03-09-2003 WO 0246792 A2 13-06-2002 NO 20032600 A 29-07-2003
US 5229939	A	20-07-1993	NONE